Remarks

In light of the above amendments and remarks to follow, reconsideration is respectfully requested.

Claim 4 complies with 35 U.S.C. 112, first paragraph

In order to illustrate how the present application discloses a technique for producing a third signal value as a non-linear function of first and second signal values, in their Response of June 29, 2001 Applicants referred to the sentence in lines 16-19 on page 27 of the present application. In maintaining his rejection, the Examiner expressed the view that Applicants have not made it clear how ranking of signal values according to their magnitudes would produce a third signal value that is a non-linear function of first and second signal values. (See page 10 of the final Office Action of July 27, 2001).

In order to address the Examiner's concerns, a more comprehensive explanation of the Applicants' position is now provided.

The above-cited portion of the application explains that the ranking of each possible symbol's magnitude is an alternative to calculating and storing signal SNR's as in line 1 of page 27. For example, as a message is decoded, first the peaks of the marker symbols in the message are found. See, for example, the embodiment described on page 24, lines 18-20. Then the peaks of the signal values (comparison SNR values) representing the data symbols are detected. Refer to lines 20-21 of page 24.

With reference to Figure 9, and page 25 lines 3 to 9, it will be seen that SNR's are accumulated in each FFT interval for each possible code symbol, A, B, 0-9. Once the marker symbol peaks are determined (e.g., symbol "A" in the third FFT), then the

decoder will know where in the various FFT intervals to look for the peaks of the accumulated SNR's representing the data symbols.

It will be apparent to one of ordinary skill in the art from the disclosure in lines 16-19 on page 27 (discussed above) that the peak value of the accumulated SNR's representing the code symbol within the expected FFT interval can be found readily by ranking the magnitudes of the accumulated SNR's representing each possible symbol 0-9. That is, for the FFT interval being considered, the symbol value (0-9) having the greatest accumulated SNR's or "signal value" in that interval is deemed detected. All other possible symbols thus have non-peak accumulated SNR's or signal magnitudes.

This process of ranking the various accumulated SNR's (i.e., signal values) is a function which transforms the peak signal value into a corresponding code symbol value 0-9. It will be seen that, by ranking the signal values to determine the peak signal value and by assigning a symbol value to the corresponding FFT interval based on this determination, the symbol value is thus a non-linear function of its corresponding signal value. That is, the function which produces the symbol value cannot be expressed as a value proportional to the corresponding signal value.

However, before the message symbol represented by a given code symbol is determined, in this embodiment a second code symbol different from the first code symbol must be detected. As explained in lines 8-9 on page 25, if the last data code symbol is "4", a data (code) symbol "6" must be detected in a different, time displaced FFT (period 48 in Figure 9). The code symbol "6" is detected in the same fashion, that is, by ranking the accumulated SNR's or signal values for all possible code symbols to determine which has the largest or peak magnitude in period 48 of Figure 9. Once again, the signal value representing the second code symbol has been transformed through the peak value determination process into a code symbol value. As before, this is a non-linear function of the signal value.

Lastly, to determine whether a message symbol has been detected, the offset between the two code symbols which should correspond to the same message symbol, is determined. That is, if the first code symbol is "4" and the second code symbol is "6", then their offset or δ is "2", as indicated in lines 8-9 on page 25. It will be seen that this third signal value (the offset) is equal to a linear combination of the first and second code symbol values. That is, $6 - 4 = 2$. If this offset or "third signal value" is the correct value, then the message symbol represented by the code symbols "4" and "6" is deemed detected.

Accordingly, the third signal value is a linear function of the code symbols "4" and "6" which, in turn, are non-linear functions of their first and second signal values, the corresponding accumulated SNR's. Consequently, the third signal value (the offset) is a non-linear function of the first and second signal values, the peak accumulated SNR's.

It is thus respectfully submitted that the subject matter of claim 4 is fully supported by the specification, and that the rejection of claim 4 under 35 U.S.C. 112 should be removed.

Claims 1-3 and 5-18 are Not Anticipated by Jensen, et al.

It is the Examiner's view that Jensen, et al. show a decoding technique in which two code symbols that are displaced in time are accumulated to detect a common message symbol. The Examiner refers to Figure 6 of Jensen, et al. in which stored time-domain representations of the various code symbols are read out to produce a sequence of code symbols. The Examiner also refers to the text of Jensen, et al. in column 21, lines 23-45 regarding the detection of the presence of code symbols by accumulating data repeatedly over a predetermined interval.

More precisely, the text of the reference in column 21, lines 25-29 provides:

> [T]he apparatus of FIG. 11 accumulates data indicating the presence of code components in each of the bins of interest repeatedly for at least a major portion of the *predetermined interval in which a code symbol can be found* [Emphasis added].

Clearly, this cited portion of the reference describes a technique for detecting a *single code symbol*, since the accumulation of data as described therein takes place within an interval in which only a single code symbol can be found.

In order to clarify the distinction between Applicants' present invention and that of Jensen, et al., claims 1, 13 and 16 have been amended to provide not only that the first and second code symbols representing one message symbol are displaced in time, but that at least one code symbol representing a different one of the message symbols is positioned in time between the first and second code symbols. Refer, for example, to Figure 3C of the present application in which symbols S_1 and $S_{(1+\delta) \bmod M}$ represent a common message symbol with code symbols representing other message symbols positioned in time between them. See also page 13, lines 15-19.

In contrast to the cited portion of Jensen, et al. in which the detection of a symbol is dependent solely on the accumulation of data within one symbol interval, in the present invention a message symbol is detected based on the accumulation of signal values representing at least *two code symbols* separated in time by at least one further code symbol representing a *different message symbol*.

The codes representing the message symbol are thus spread out in time, since they are separated by one or more codes representing one or more *other* message symbols. This spreading out of the data representing a single message symbol and the accumulation of the spread-out data in the decoding systems and methods of the present invention substantially improves its ability to detect the encoded messages in the event of burst errors and the like.

In light of the foregoing distinctions between claims 1, 13 and 16 and the disclosure of Jensen, et al. it is respectfully submitted that these claims are patentable over the prior art.

Claims 2, 3, 5-12, 14, 15, 17 and 18 have been rejected as anticipated by the Jensen, et al. reference. Since each of these claims depends from one of claims 1, 13 and 16, it is respectfully submitted that these claims also are patentable over the prior art.

Claim 4 is Not Obvious over Jensen, et al.

Claim 4 depends from claim 1. Accordingly, it is respectfully submitted that claim 4 is patentable over the prior art.

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. The attached page is captioned, "Version with Markings to Show Changes Made."

Early and favorable consideration hereof is solicited.

Respectfully submitted,

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Version with Markings to Show Changes Made

1. (Amended) A system for decoding a message symbol of a plurality of message symbols embedded in an audio signal, each of the message symbols being represented by first and second code symbols displaced in time in the audio signal with at least one code symbol representing a different one of the message symbols positioned in time between the first and second code symbols [at least one message symbol represented by a plurality of code symbols in an audio signal], comprising:

[means for receiving first and second code symbols representing a common message symbol, the first and second code symbols being displaced in time in the audio signal;]

means for accumulating a first signal value [representing the] of a first code symbol representing a predetermined message symbol and a second signal value [representing the] of a second code symbol representing the same predetermined message symbol; and

means for examining the accumulated first and second signal values to detect the [common] predetermined message symbol represented by the first and second code symbols.

2. (Amended) The system of claim 1, wherein the accumulating means is operative to produce a third signal derived from the first and second signal values and the examining means is operative to detect the [common] predetermined message symbol based on the third signal [symbol] value.

6. (Amended) The system of claim 2, wherein the plurality of message symbols is represented by [receiving means is operative to receive] plural sets of first and second code symbols [signals], each set representing a respective one of the [a] plurality of message symbols, the plural sets of first and second code symbols being

arranged as a message having a predetermined sequence including at least one marker symbol and at least one data symbol, <u>and wherein</u> the accumulating means is operative to accumulate sets of first and second signal values, each signal value set corresponding to a respective one of the sets of first and second code <u>symbols</u> [signals] and including a first signal value representing the first code <u>symbol</u> [signal] of the respective code <u>symbol</u> [signal] set and a second signal value representing the second code <u>symbol</u> [signal] thereof and the examining means is operative to detect the message by detecting the presence of the marker symbol based on its signal value set and to detect at least one data symbol based on the detected presence of the marker symbol and the corresponding signal value set of the at least one data symbol.

7. (Amended) The system of claim 1, wherein the accumulating means is operative to store the first and second signal values, and the examining means is operative to detect the <u>predetermined</u> [common] message symbol by examining both of the first and second signal values.

13. (Amended) A method for decoding <u>a message symbol of a plurality of message symbols incorporated in an audio signal, each of the message symbols being represented by first and second code symbols displaced in time in the audio signal with at least one code symbol representing a different one of the message symbols positioned in time between the first and second code symbols</u> [at least one message symbol represented by a plurality of code symbols in an audio signal], comprising:

[receiving first and second code symbols representing a common message symbol, the first and second code symbols being displaced in time in the audio signal;]

accumulating a first signal value [representing the] <u>of a</u> first code symbol <u>representing a predetermined message symbol</u> and a second signal value [representing

the] <u>of a </u>second code symbol <u>representing the same predetermined message symbol</u>; and

examining the accumulated first and second signal values to detect the [common] <u>predetermined </u>message symbol.

14. (Amended) The method of claim 13, <u>further comprising</u> [wherein the step of] receiving <u>the</u> first and second code symbols <u>by</u> [comprises] transducing an acoustic audio signal to an electrical signal, the acoustic audio signal having a plurality of message symbols comprising source data for the acoustic audio signal, and [further comprising] storing data representing indications of detected message symbols.

16. (Amended) A system for decoding <u>a message symbol of a plurality of message symbols incorporated in an audio signal, each of the message symbols being represented by first and second code symbols displaced in time in the audio signal with at least one code symbol representing a different one of the message symbols positioned in time between the first and second code symbols</u> [at least one message symbol represented by a plurality of code symbols in an audio signal], comprising:

an input device for receiving <u>a</u> first [and second] code <u>symbol representing a predetermined message symbol</u> [symbols] <u>and a second code symbol</u> representing [a common] <u>the same predetermined</u> message symbol [, the first and second code symbols being displaced in time in the audio signal]; and

a digital processor in communication with the input device to receive data therefrom representing the first and second code symbols, the digital processor being programmed to accumulate a first signal value representing the first code symbol and a second signal value representing the second code symbol, the digital processor being further programmed to examine the accumulated first and second signal values to detect the [common] <u>predetermined</u> message symbol.